We claim:

1. A motion sensor, comprising
a chamber capable of holding a medium wherein the medium includes a sample,
at least one force transducing sensor positioned to interact dynamically with said sample, and
means for detecting the dynamic interaction of the force transducing sensor with the sample whereby a characteristic of the sample can be deduced.

2. The motion sensor of claim 1 wherein the sample includes at least one specimen.

3. The sensor of claim 1 wherein the force transducing sensor is a MEMS device.

4. The sensor of claim 3 where the MEMS device is a cantilever.

5. The sensor of claim 1 wherein the samples are biological samples.

6. The sensor of claim 5 where the biological samples are cells.

7. The sensor of claim 1 wherein the means for detecting uses optics.

8. The sensor of claim 1 wherein the medium is appropriate for biological samples.

9. The sensor of claim 1 wherein the medium is pumped at a constant rate.

10. The sensor of claim 1 wherein the medium is pumped with repetitive pulses.

11. The sensor of claim 1 wherein the force transducing sensor includes a ribbon.

12. The sensor of claim 4 wherein the cantilever has a width that increases with distance measured from the cantilever support.

13. A motion sensing system comprising
a chamber adapted to receive a medium having therein a multiplicity of specimens,

at least one force transducing sensor positioned within the chamber so as to be immersed in the medium during operation,

force transducing sensor surface coatings having characteristic residence times appropriate for the specimens, and

motion detector for detecting motion of the force transducing sensor whereby the residence times of the specimens on the surface coatings can be determined.

14. The motion sensing system of claim 13 wherein the specimens are part of a biological sample.

15. The motion sensing system of claim 13 wherein the surface coatings are biologically active surface coatings.

16. The motion sensing system of claim 13 wherein the force transducing sensor is a MEMS device.

17. The motion sensing system of claim 16 wherein the MEMS device is a cantilever.

18. The motion sensing system of claim 17 wherein the MEMS device includes at least two cantilevers.

19. The motion sensing system of claim 18 wherein one cantilever is a reference cantilever with a biologically inactive surface coating.

20. The sensor of claim 5 wherein the biological samples as sperm.

21. A motion sensor comprising

a chamber adapted to receive for analysis a medium having therein a multiplicity of motile specimens moving within the medium with a characteristic motile frequency,

at least one force transducing sensor positioned within the chamber so as to be immersed in the medium during analysis and to interact dynamically with the motile specimens, and

a motion detector for determining the characteristic motile frequency of the specimens by detecting the dynamic interaction of the force transducing sensor.

22. The motion sensor of claim 21 wherein the motile specimens are biologically motile.

23. The motion sensor of claim 22 wherein the motile specimens are sperm.

24. The motion sensor of claim 21 wherein the force transducing sensor is a MEMS device.

25. The motion sensor of claim 24 wherein the MEMS device is a cantilever.

26. A method for determining characteristics of a sample under analysis comprising the steps of

providing at least one force transducing sensor having a surface, the surface having a coating thereon capable of interacting with the specimens,

providing specimens in a fluid,

causing an interaction between the specimens and the surface allowing said samples to interact with the force transducing sensor, and

detecting a characteristic of the specimen in accordance with its interaction with the force transducing sensor.

27. A nanomotion sensing system comprising

at least one transparent substrate, the substrate including at least one lens and having first and second surfaces,

a light source and a photodetector affixed to a first surface of the substrate,

a force transducing sensor affixed to the second surface of the assembly in optical alignment with the light source and photodetector whereby motion of said cantilever can be detected by the photodetector.

28. The nanomotion sensing system of claim 28 wherein the substrate, light source, photodetector and sensor are integrated into a single optical assembly.

29. The nanomotion sensing system of claim 27 wherein the light source is a laser.

30. The nanomotion sensing system of claim 27 wherein the force transducing sensor is affixed to the substrate at a predetermined angle.

31. The nanomotion sensing system of claim 27 wherein the force transducing sensor is a MEMS device.

32. The nanomotion sensing system of claim 31 wherein the MEMS device is a cantilever.